



The Central American tree snake, *Imantodes gemmistratus* (Cope, 1861) (Squamata: Dipsadinae): a new record for Zacatecas, Mexico

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Abstract. We document the first record of *Imantodes gemmistratus* for Zacatecas state, Mexico. In August 2016, one adult male was found in a dry forest and oak forest ecotone in the Municipality of Valparaíso. This new record extends known distribution of the species 166 km to the northeast from the nearest previous record in Nayarit state.

Key words. Sierra Madre Occidental; dry forest; oak forest; first record; reptile; arboreal snake

The snake genus *Imantodes* is distinguished by a very slender body, a large head clearly distinct from the neck, and large protruding eyes. These snakes are crepuscular and nocturnal shrub dwellers, and during night they can be seen usually stretched out, gliding slowly through the vegetation. Anole lizards (*Anolis*) are their main prey, but they also consume small frogs and eggs. All the species of this genus are oviparous (KÖHLER 2008). The genus comprises 8 species (UETZ et al. 2016), among them *Imantodes gemmistratus* (Cope, 1861), which presents a wide distributional range in northern and central America, from southwestern Chihuahua and southern Sonora (Mexico), along the Pacific versant to Colombia, and from northern Veracruz through the Atlantic versant to Quintana Roo, with an isolated record in the Atlantic versant of Costa Rica (ZWEIFEL 1959, GARCÍA & CEBALLOS 1994, KÖHLER 2008, LEMOS-ESPINAL & SMITH 2009, RAMÍREZ-BAUTISTA et al. 2014). In Mexico, this species inhabits tropical dry, moist, and coniferous forests of Campeche, Chiapas, Chihuahua, Colima, Estado de México, Guerrero, Hidalgo, Jalisco, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Quintana Roo, Sinaloa, Sonora, Tabasco, Veracruz, and Yucatán states, from sea level to 2,000 m above sea level (ZWEIFEL

1959, ÁLVAREZ DEL TORO 1982, MYERS 1982, GARCÍA & CEBALLOS 1994, RAMÍREZ-BAUTISTA 1994, LEMOS-ESPINAL & SMITH 2009, CANSECO-MÁRQUEZ & GUTIÉRREZ-MAYÉN 2010). *Imantodes gemmistratus* is listed in Mexico as “Sujeta a Protección Especial” (subject to special protection) by the government’s list of threatened species (DIARIO OFICIAL DE LA FEDERACIÓN 2010), but it has not been evaluated by the IUCN. Here, we report the first record of the Central American Tree Snake, *I. gemmistratus* from Zacatecas state, Mexico.

An adult male *I. gemmistratus* (Fig. 1) was found alive on 4 August 2016 at 23:00 h, 19.5 km southwest of Valparaíso, Municipality of Valparaíso, Zacatecas (22.6847°N, 103.7345°W [WGS84]; 2,270 m above sea level). The adult male was collected on a road surrounded by dry forest–oak forest ecotone. This vegetation is composed of Huizache (*Acacia farnesiana*), Fern-leaf Acacia (*A. pennatula*), Catclaw Mimosa (*Mimosa monancistra*), Palo Blanco (*Ipomoea intrapilosa*), Cazahuate (*I. muricoides*), Prickly Pear (*Opuntia fuliginosa*), oaks (*Quercus* spp.) and Pointleaf Manzanita (*Arctostaphylos pungens*) (SOUZA & MARTÍNEZ 2010). The specimen identification was verified by Bradford Hollingsworth and a photo was deposited in the San Diego Natural History Museum (SDSNH_HerpPC_05340). The specimen itself was collected under the permit SEMARNAT SGPA/DGVS/03079/16 and deposited in the Vertebrate Collection of the Universidad Autónoma de Aguascalientes (CZ-UAA-REP-0645). Locality records for *I. gemmistratus* were obtained from the Global Biodiversity Information Facility and literature (GBIF 2016; Appendix Table A1).

Imantodes gemmistratus is a slender snake reaching 880 mm in total length (TL). The ventral scales in the populations from northwestern Mexico number 220–237, the subcaudals



Figure 1. Adult male specimen CZ-UAA-REP-0645 of *Imantodes gemmistratus* from Valparaíso, Zacatecas, Mexico (SDSNH_HerpPC_05340).

114–130 in males and 109–129 in females (LEMOS-ESPINAL & SMITH 2009). The head scales are normal, with 1 loreal and 1 preocular, a singular anterior temporal, usually 8 supralabials (4, 5 and 6 entering the orbit) and 9 infralabials. The internasals are about 1/3 the size of the prefrontals. Individuals of this species possess large and protruding eyes whose diameter is 3 times their distance from the lip. The snake has grooved rear fangs and a vertical pupil. The head is pale tan without markings. There are 36–53 large, light reddish brown dark edged blotches on the body, narrowing on the sides, all reaching the edges of the ventrals, but becoming lighter posteriorly so that they cannot be discerned. The interspaces are light gray or brown. The tail is more or less uniformly brownish above (ZWEIFEL 1959, SAVAGE & SCOTT 1985; LEMOS-ESPINAL & SMITH 2009). *Imantodes gemmistratus* is the only arboreal snake in the state with such a slim body and a noticeable difference between the neck and head with a blunt snout and large eyes. The male specimen from Zacatecas (snout–vent length = 455 mm, TL = 655 mm; Fig. 1) presents 8 supralabials (4, 5 and 6 entering the orbit) and 8 infralabials, 210 ventrals, 119 subcaudals, an undivided anal plate, and 52 dorsal body blotches. All characters coincide with the available descriptions of Mexican individuals except the lower number of ventral scales. However, still lower ventral counts have been obtained across the species' entire range (KÖHLER 2008).

This is the first record of this species for Zacatecas state and extends its known distribution by 166 km northeast in a straight-line from “4.1 km northwest [of] Rosamorada, Nayarit” (LACM-103516; GBIF 2016; Fig. 2). The nominal species *I. gemmistratus* is likely a species complex with many lineages currently recognized as 7 subspecies (ZWEIFEL 1959). Our specimen corresponds to the northwestern form (*I. g.*

latistratus[Cope 1887]). This new record and those records of other reptile species previously recorded (BAÑUELOS-ALAMILLO et al. 2015a, b, CARBAJAL-MÁRQUEZ et al. 2015, BAÑUELOS-ALAMILLO & CARBAJAL-MÁRQUEZ 2016, BAÑUELOS-ALAMILLO et al. 2016) suggest that additional species typical of the Pacific slope likely remain to be documented in Zacatecas. It also reinforces the importance of conserving the canyons of the upper Río Grande de Santiago basin that serve as biological corridors.

LITERATURE CITED

ÁLVAREZ DEL TORO, M. 1982. Los reptiles de Chiapas. Colección Libros de Chiapas. Tuxtla Gutiérrez: Publicación del Instituto de Historia Natural. 248 pp.

BAÑUELOS-ALAMILLO, J.A., CARBAJAL-MÁRQUEZ, R.A., QUINTERO-DÍAZ, G.E. & OCHOA, G.M. 2015a. *Heloderma horridum* (Mexican Beaded Lizard): geographic distribution. Herpetological Review 46: 383.

BAÑUELOS-ALAMILLO, J.A., CARBAJAL-MÁRQUEZ, R.A., QUINTERO-DÍAZ, G.E. & OCHOA, G.M. 2015b. *Trimorphodon paucimaculatus* (Sinaloan Lyre Snake): geographic distribution. Herpetological Review 46: 387.

BAÑUELOS-ALAMILLO, J.A. & CARBAJAL-MÁRQUEZ, R.A. 2016. *Hypsiglena affinis*: geographic distribution. Mesoamerican Herpetology 3: 198.

BAÑUELOS-ALAMILLO, J.A., CARBAJAL-MÁRQUEZ, R.A. & ROJO-CARRILLO, G. 2016. *Boa imperator*: geographic distribution. Mesoamerican Herpetology 3: 184.

CANSECO-MÁRQUEZ, L. & GUTIÉRREZ-MAYÉN, M.G. 2010. Anfibios y reptiles del Valle de Tehuacán-Cuicatlán. México, DF: Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Fundación para la Reserva de la Biosfera Cuicatlán A.C., Benemérita Universidad Autónoma de Puebla. 302 pp.

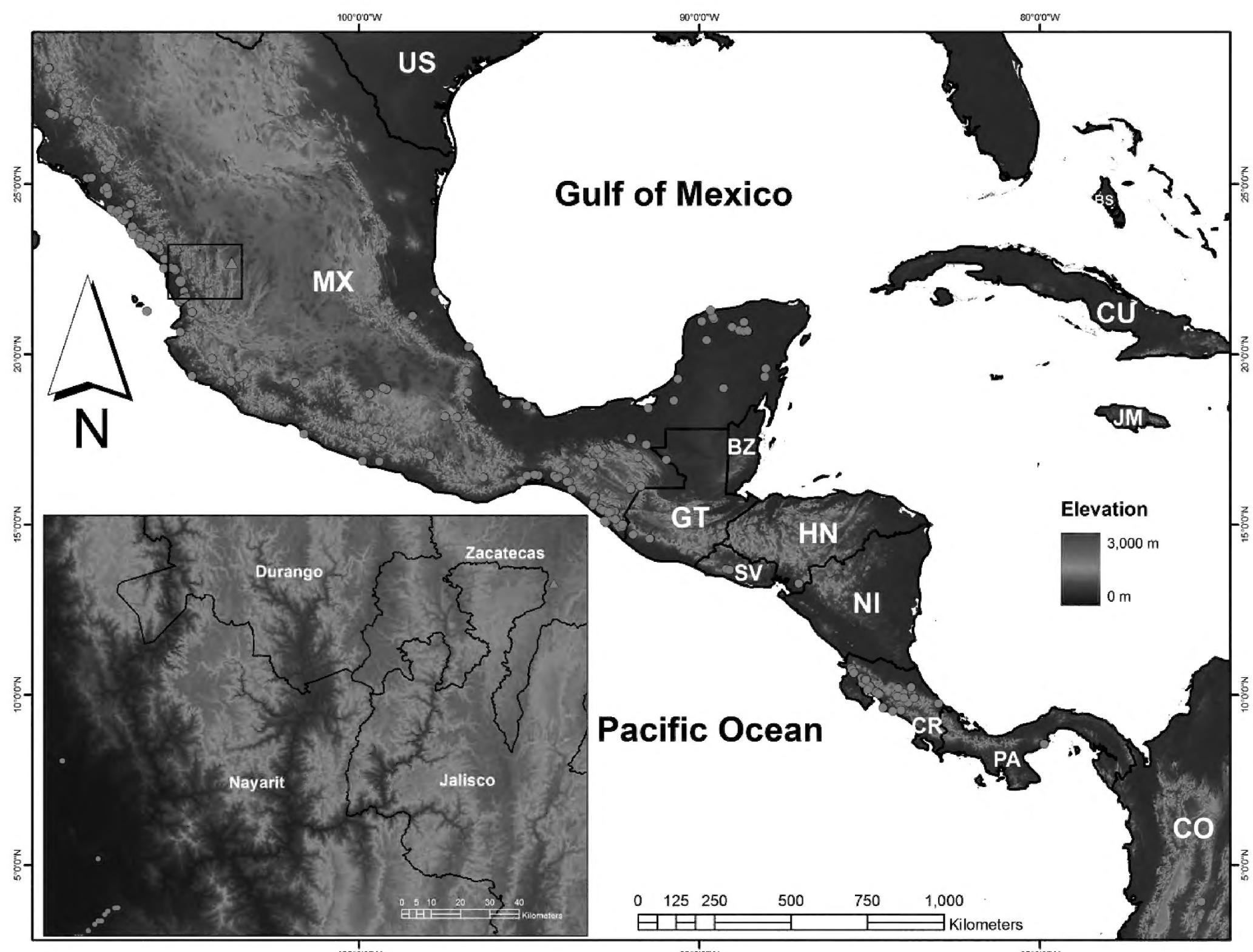


Figure 2. Collecting localities for *Imantodes gemmistratus* across its geographic range. Blue dots show previous records (see Appendix Table A1). The red triangle represents our new record of *I. gemmistratus* for Zacatecas at Valparaíso, the red circle the nearest previously reported locality at Nayarit. Country codes are as follows: BS = Bahamas, BE = Belize, CO = Colombia, CR = Costa Rica, CU = Cuba, GT = Guatemala, HN = Honduras, JM = Jamaica, MX = Mexico, NI = Nicaragua PA = Panama, SA = El Salvador, US = United States.

CARBAJAL-MÁRQUEZ, R.A., BAÑUELOS-ALAMILLO, J.A., RIVAS-MERCADO, E.A., QUINTERO-DÍAZ, G.E. & DOMÍNGUEZ DE LA RIVA, M.A. 2015. *Crotalus basiliscus* (Mexican West Coast Rattlesnake): geographic distribution. Herpetological Review 46: 385.

COPE, E.D. 1861. Contributions to the ophiology of Lower California, Mexico and Central America. Proceedings of the Academy of Natural Sciences of Philadelphia 13: 292–306.

DIARIO OFICIAL DE LA FEDERACIÓN. 2010. Norma Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental—Especies nativas de México de flora y fauna silvestres—Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio—Lista de especies en riesgo, 30 de diciembre de 2010. Accessed at http://www.profepa.gob.mx/innovaportal/file/435/1/NOM_059_SEMARNAT_2010.pdf, 21 February 2017.

GARCÍA, A. & CEBALLOS, G. 1994. Guía de campo de los reptiles y anfibios de la costa de Jalisco, México. México, DF: Fundación Ecológica de Cuixmala A. C., Instituto de Biología UNAM. 184 pp.

GBIF (GLOBAL BIODIVERSITY INFORMATION FACILITY). 2016. GBIF Occurrence download. Accessed at <https://doi.org/10.15468/dl.dkgz>

KÖHLER, G. 2008. Reptiles of Central America. 2nd edition. Offen-

bach: Herpeton Verlag. 400 pp.

LEMOS-ESPINAL, J.A. & SMITH, H.M. 2009. Amphibians and reptiles of the state of Chihuahua, Mexico. México, DF: UNAM, CONABIO, University of Colorado at Boulder. 613 pp.

MYERS, C.W. 1982. Blunt-headed vine snakes (*Imantodes*) in Panama, including a new species and other revisionary notes. American Museum Novitates 2738: 1–50.

RAMÍREZ-BAUTISTA, A. 1994. Manual y claves ilustradas de los anfibios y reptiles de la región de Chamela, Jalisco, México. Cuadernos del Instituto de Biología 23. México, DF: Universidad Nacional Autónoma de México. 127 pp.

RAMÍREZ-BAUTISTA, A., HERNÁNDEZ-SALINAS, U., CRUZ-ELIZALDE, R., BERROZABAL-ISLAS C., LARA-TUFIÑO, D., GOYENECHEA, I. & CASTILLO-CERÓN, J. 2014. Los anfibios y reptiles de Hidalgo, México: diversidad, biogeografía y conservación. Pachuca: Universidad Autónoma del Estado de Hidalgo y Sociedad Herpetológica Mexicana. 387 pp.

SAVAGE, J.M. & SCOTT, N.J. 1985. The *Imantodes* (Serpentes: Colubridae) of Costa Rica: two or three species? Revista de Biología Tropical 33: 107–132.

SOUZA, M. & MARTÍNEZ, E. 2010. Cuenca Alta del Río Santiago, Jalisco, Zacatecas, Nayarit y Durango; pp. 421–423, in: CEBALLOS, G., MARTÍNEZ, L., GARCÍA, A., ESPINOZA, E., BEZAURY-CREEL,

J. & DIRZO, R. (eds.). Diversidad, amenazas, y áreas prioritarias para la conservación de las selvas secas del Pacífico de México. México, DF: Fondo de Cultura Económica, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad.

UETZ, P., FREED, P. & HOŠEK, J. 2016. The reptile database. Accessed at <http://www.reptile-database.org>, 21 February 2017.

ZWEIFEL, R.G. 1959. Snakes of the genus *Imantodes* in western Mexico. American Museum Novitates 1961: 1–17.

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APPENDIX

Table A1. Records of *Imantodes gemmistratus* obtained from the present study, published literature and museum specimens consulted in GBIF. AMNH: American Museum of Natural History; CAS: California Academy of Science; CM: Carnegie Museum of Natural History; CUMV: Cornell University Museum of Vertebrates; ECOSUR-CH: El Colegio de la Frontera Sur-Chetumal; IHN: Instituto de Historia Natural-Chiapas; KU: University of Kansas Natural History Museum; LACM: Natural History Museum of Los Angeles County; MCZ: Museum of Comparative Zoology; MNHUK: Museum of Natural History University of Kansas; MLS: Museo de La Salle; MZFC: Museo de Zoología Facultad de Ciencias-UNAM; SBMNH: Santa Barbara Museum of Natural History; SDNHM: San Diego Natural History Museum; TCWC: Texas Cooperative Wildlife Collection; UCM: University of Colorado Museum; UMMZ: University of Michigan Museum of Zoology; USNM: National Museum of Natural History, Smithsonian Institution; UTEP: University of Texas at El Paso. Country codes are BS = Bahamas, BE = Belize, CO = Colombia, CR = Costa Rica, CU = Cuba, GT = Guatemala, HN = Honduras, JM = Jamaica, MX = Mexico, NI = Nicaragua PA = Panama, SA = El Salvador, US = United States.

Country	State	Collection	Catalog number	Latitude	Longitude	Source
CO	Tolima	MLS	966	3.9167	-75.2500	GBIF
CR	Alajuela	LACM	150771	9.9939	-84.2108	GBIF
CR	Cartago	LACM	150769	9.9000	-83.9833	GBIF
CR	Cartago	KU	35508	9.9000	-83.6833	GBIF
CR	Cartago	LACM	150772	9.7674	-83.8560	GBIF
CR	Cartago	KU	35509	9.9000	-83.6833	GBIF
CR	Guanacaste	LACM	150776	10.6387	-85.4506	GBIF
CR	Guanacaste	LACM	150783	10.1500	-85.0500	GBIF
CR	Guanacaste	LACM	150780	10.7311	-85.5091	GBIF
CR	Guanacaste	MVZ	78748	10.4333	-85.1000	GBIF
CR	Guanacaste	CM	107331	10.2392	-84.9863	GBIF
CR	Guanacaste	LACM	150777	10.4431	-85.1080	GBIF
CR	Guanacaste	LACM	150785	10.7890	-85.5346	GBIF
CR	Guanacaste	LACM	150787	10.4790	-85.1272	GBIF
CR	Guanacaste	LACM	150773	10.6785	-85.4745	GBIF
CR	Guanacaste	LACM	150774	10.4544	-85.1281	GBIF
CR	Guanacaste	KU	125478	10.2429	-84.9908	GBIF
CR	Guanacaste	KU	140061	10.4910	-85.2225	GBIF
CR	Guanacaste	LACM	150778	10.4544	-85.1281	GBIF
CR	Guanacaste	LACM	150775	10.3333	-85.2000	GBIF
CR	Guanacaste	CM	69095	10.4392	-85.1163	GBIF
CR	Heredia	LACM	150779	10.1894	-84.1503	GBIF
CR	Limon	LACM	150766	9.7333	-82.9667	GBIF
CR	Limon	KU	31945	10.2139	-83.7699	GBIF
CR	Puntarenas	LACM	150786	10.0167	-84.7000	GBIF
CR	Puntarenas	LACM	150782	9.5167	-84.3167	GBIF
CR	Puntarenas	LACM	150781	9.5167	-84.3167	GBIF
CR	Puntarenas	LACM	150784	9.6159	-84.5963	GBIF
CR	Puntarenas	LACM	150788	9.5167	-84.3167	GBIF
CR	Puntarenas	CM	107330	10.0792	-84.8163	GBIF
CR	Puntarenas	USNM	245016.6098877	10.0659	-84.7629	GBIF
CR	Puntarenas	iNaturalist	1072003	10.0266	-84.7366	GBIF
CR	San Jose	LACM	150767	9.5333	-84.0667	GBIF
CR	San Jose	LACM	150770	9.9333	-84.1833	GBIF
CR	San Jose	LACM	150768	10.0500	-84.0000	GBIF
GT	Quezaltenango	MVZ	80005	14.7000	-91.9369	GBIF
GT	Suchitepequez	CAS	66941	14.5781	-91.4493	GBIF
GT	Suchitepequez	CAS	66942	14.5781	-91.4493	GBIF
GT	Suchitepequez	CAS	66943	14.5781	-91.4493	GBIF
HN	Choluteca	SDNHM	72797	13.2579	-87.0689	GBIF
MX	Campeche	UMMZ	81920	18.4170	-91.5000	GBIF
MX	Campeche	KU	157574	18.6407	-90.7399	GBIF

Continued

Table 1. Continued.

Country	State	Collection	Catalog number	Latitude	Longitude	Source
MX	Campeche	UMMZ	81921	18.4170	-91.5000	GBIF
MX	Campeche	ECOSUR-CH	960	19.0020	-89.2800	GBIF
MX	Campeche	IHN	1124 / 4348 / V050	19.2720	-90.6230	GBIF
MX	Chiapas	IHN	662 / 5518 / V050	15.0990	-92.7870	GBIF
MX	Chiapas	MVZ	177761	15.1500	-92.4600	GBIF
MX	Chiapas	USNM	110524	17.5080	-91.9810	GBIF
MX	Chiapas	UTEP	H-9519	16.2508	-93.8800	GBIF
MX	Chiapas	MVZ	112407	15.0078	-92.2485	GBIF
MX	Chiapas	MVZ	177761	15.1508	-92.4452	GBIF
MX	Chiapas	LACM	38189	15.6180	-93.1070	GBIF
MX	Chiapas	IHN	737 / 264478 / U014	16.7580	-93.1100	GBIF
MX	Chiapas	USNM	110524.6082444	17.5424	-91.9916	GBIF
MX	Chiapas	USNM	110527.6082447	17.5424	-91.9916	GBIF
MX	Chiapas	IHN	74 / 4656 / V050	16.7530	-93.1170	GBIF
MX	Chiapas	LSUMZ	110524	17.5170	-91.9830	GBIF
MX	Chiapas	LACM	40549 / 263225 / U014	14.9350	-92.2640	GBIF
MX	Chiapas	IUMNH	33651	15.3620	-92.6540	GBIF
MX	Chiapas	UC	39696	15.3710	-92.6000	GBIF
MX	Chiapas	USNM	110526	17.5080	-91.9810	GBIF
MX	Chiapas	LACM	9503	15.4108	-92.8299	GBIF
MX	Chiapas	USNM	110523.6082443	17.5424	-91.9916	GBIF
MX	Chiapas	LACM	114140	15.2080	-92.5640	GBIF
MX	Chiapas	IUMNH	6286	16.0450	-92.0200	GBIF
MX	Chiapas	IUMNH	39147	16.5780	-93.9250	GBIF
MX	Chiapas	LACM	9503 / 265004 / U014	15.4610	-92.9060	GBIF
MX	Chiapas	ND	1847 / 266066 / U014	15.8020	-93.0690	GBIF
MX	Chiapas	TCWC	17168	16.1140	-92.0250	GBIF
MX	Chiapas	USNM	110525	17.5080	-91.9810	GBIF
MX	Chiapas	ENCB	12949 / 7283 / CC002	16.9010	-90.9690	GBIF
MX	Chiapas	LSUMZ	110527	17.5170	-91.9830	GBIF
MX	Chiapas	IHN	1599	15.0540	-92.7450	GBIF
MX	Chiapas	CAS	163730	16.2650	-93.8269	GBIF
MX	Chiapas	UCM	39696	17.2107	-92.9800	GBIF
MX	Chiapas	IHN	2644	15.4000	-92.5800	GBIF
MX	Chiapas	USNM	110521	15.3620	-92.6210	GBIF
MX	Chiapas	IHN	1456 / 13185 / V050	15.8020	-93.0690	GBIF
MX	Chiapas	LSUMZ	110523	17.5170	-91.9830	GBIF
MX	Chiapas	USNM	110525.6082445	17.5424	-91.9916	GBIF
MX	Chiapas	MVZ	132938	15.0020	-92.2474	GBIF
MX	Chiapas	ENCB	11142	16.8360	-93.1440	GBIF
MX	Chiapas	UTEP	9519 / 265586 / U014	16.2600	-93.8760	GBIF
MX	Chiapas	MVZ	112407	14.9120	-92.3390	GBIF
MX	Chiapas	USNM	110521.6082441	29.6702	-106.0903	GBIF
MX	Chiapas	IHN	654 / 264446 / U014	16.7580	-93.1100	GBIF
MX	Chiapas	LACM	9501	15.0009	-92.3999	GBIF
MX	Chiapas	IHN	897 / 264646 / U014	16.7580	-93.1100	GBIF
MX	Chiapas	USNM	110523	17.5080	-91.9810	GBIF
MX	Chiapas	LACM	38189	15.5708	-93.1199	GBIF
MX	Chiapas	IHN	152 / 4816 / V050	16.7530	-93.1170	GBIF
MX	Chiapas	IHN	211 / 4927 / V050	16.7580	-93.1100	GBIF
MX	Chiapas	USNM	110527	17.5080	-91.9810	GBIF
MX	Chiapas	IHN	482 / 5287 / V050	15.3200	-92.6610	GBIF
MX	Chiapas	IHN	1108 / 264781 / U014	16.7890	-93.0920	GBIF
MX	Chiapas	CAS	163750	16.2789	-93.8731	GBIF
MX	Chiapas	LSUMZ	110522	17.5170	-91.9830	GBIF
MX	Chiapas	UMAA	95434	15.3210	-92.6620	GBIF
MX	Chiapas	USNM	110522	17.5080	-91.9810	GBIF
MX	Chiapas	IHN	1008 / 264710 / U014	16.7510	-93.1150	GBIF
MX	Chiapas	LACM	9501	15.0140	-92.4010	GBIF
MX	Chiapas	UMAA	87663 / 285550 / U014	15.3790	-92.4860	GBIF
MX	Chiapas	IHN	1847 / 288861 / U014	15.8020	-93.0690	GBIF

Continued

Table 1. Continued.

Country	State	Collection	Catalog number	Latitude	Longitude	Source
MX	Chiapas	IHN	28 / 4573 / V050	16.7530	-93.1170	GBIF
MX	Chiapas	USNM	110522.6082442	17.5424	-91.9916	GBIF
MX	Chiapas	MVZ	132938 / 292922 / U014	15.0150	-92.2440	GBIF
MX	Chiapas	LACM	9502	15.3808	-92.7599	GBIF
MX	Chiapas	LACM	9502 / 265003 / U014	15.4060	-92.8220	GBIF
MX	Chiapas	CM	88751	16.9600	-91.7800	GBIF
MX	Chiapas	CAS	140967	16.0308	-93.7500	GBIF
MX	Chiapas	CAS	140973	17.0674	-92.8611	GBIF
MX	Chiapas	IUMNH	6287 / 296626 / U014	16.0300	-92.0100	GBIF
MX	Chiapas	IHN	757 / 264526 / U014	16.7580	-93.1100	GBIF
MX	Chiapas	ND	278125 / U014	16.1160	-91.7300	GBIF
MX	Chiapas	LSUMZ	110526	17.5170	-91.9830	GBIF
MX	Chiapas	LSUMZ	110525	17.5170	-91.9830	GBIF
MX	Chiapas	ND	2474 / EE005	15.8100	-93.0700	GBIF
MX	Chiapas	IHN	658 / 264452 / U014	16.7580	-93.1100	GBIF
MX	Chiapas	IHN	1368 / 265084 / U014	15.3200	-92.6610	GBIF
MX	Chiapas	UMAA	123042	16.7270	-93.1000	GBIF
MX	Chiapas	IUMNH	83096	15.4330	-92.5940	GBIF
MX	Chiapas	iNaturalist	738605	16.8574	-93.3325	GBIF
MX	Chiapas	iNaturalist	2765063	17.3391	-91.5463	GBIF
MX	Chiapas	USNM	110526.6082446	17.5424	-91.9916	GBIF
MX	Chihuahua	—	—	27.3943	-108.5358	LEMOS-ESPINAL & SMITH 2009
MX	Colima	LACM	58914	19.1906	-103.7502	GBIF
MX	Colima	LACM	2545	19.3006	-103.5102	GBIF
MX	Estado de México	AMNH	71361	18.8334	-99.6831	GBIF
MX	Guerrero	MVZ	45089	17.5521	-99.5009	GBIF
MX	Guerrero	MCZ	R-823	16.8607	-99.8901	GBIF
MX	Guerrero	MCZ	R-167181	17.4900	-99.3300	GBIF
MX	Guerrero	CAS	154315	17.6607	-101.6002	GBIF
MX	Guerrero	MCZ	R-33652	17.5557	-99.5034	GBIF
MX	Guerrero	MVZ	45088	17.5521	-99.5009	GBIF
MX	Guerrero	CAS	135271	16.8507	-99.4001	GBIF
MX	Guerrero	MCZ	R-33651	17.5557	-99.5034	GBIF
MX	Hidalgo	—	—	21.1258	-98.4110	RAMÍREZ-BAUTISTA et al. 2014
MX	Jalisco	LACM	2544	19.4006	-103.3902	GBIF
MX	Jalisco	LACM	136823	19.3606	-104.9002	GBIF
MX	Jalisco	CAS	132196	20.6605	-105.2403	GBIF
MX	Jalisco	TCWC	48057	19.8734	-104.3066	GBIF
MX	Michoacán	MZFC	12720	19.1640	-101.8700	GBIF
MX	Michoacán	MZFC	12741	19.1640	-101.8700	GBIF
MX	Morelos	ENCB	12282	19.0130	-99.2930	GBIF
MX	Morelos	ENCB	7336	18.9680	-99.1840	GBIF
MX	Nayarit	USNM	237779.6091644	21.2700	-106.2300	GBIF
MX	Nayarit	—	—	21.2368	-104.8996	ZWEIFEL 1959
MX	Nayarit	LACM	8733	21.6205	-105.1603	GBIF
MX	Nayarit	CAS	23824	21.6405	-105.1403	GBIF
MX	Nayarit	CAS	95756	21.6005	-105.1903	GBIF
MX	Nayarit	SDNHM	48139	21.6700	-105.1100	GBIF
MX	Nayarit	SDNHM	56949	21.5500	-105.2400	GBIF
MX	Nayarit	CAS	23825	21.6005	-105.2003	GBIF
MX	Nayarit	CAS	23826	21.6005	-105.2003	GBIF
MX	Nayarit	LACM	103519	21.5505	-105.2403	GBIF
MX	Nayarit	LACM	125579	21.6205	-105.1603	GBIF
MX	Nayarit	MVZ	70289	21.5399	-105.2273	GBIF
MX	Nayarit	LACM	103516	22.1405	-105.2403	GBIF
MX	Nayarit	CAS	95757	21.5505	-105.2503	GBIF
MX	Nayarit	CAS	95758	21.6505	-105.1203	GBIF
MX	Nayarit	LACM	74036	21.5705	-105.2405	GBIF
MX	Nayarit	LACM	136824	21.6905	-105.0703	GBIF
MX	Nayarit	MVZ	76710	21.6895	-105.0789	GBIF
MX	Nayarit	LACM	103515	21.8405	-105.1303	GBIF

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Table 1. Continued.

Country	State	Collection	Catalog number	Latitude	Longitude	Source
MX	Nayarit	LACM	125578	21.6205	-105.1603	GBIF
MX	Nayarit	LACM	103517	21.6805	-105.1003	GBIF
MX	Nayarit	MVZ	71343	21.5658	-105.2375	GBIF
MX	Nayarit	CAS	259466	21.5405	-105.2883	GBIF
MX	Nayarit	MVZ	70288	21.5546	-105.2436	GBIF
MX	Nayarit	LACM	6883	22.4605	-105.3803	GBIF
MX	Nayarit	LACM	103518	21.5805	-105.2203	GBIF
MX	Nayarit	LACM	136825	21.6505	-105.1303	GBIF
MX	Nayarit	LACM	35857	21.5505	-105.2703	GBIF
MX	Nayarit	LACM	74037	21.6005	-105.1803	GBIF
MX	Oaxaca	MCZ	R-27799	16.3708	-94.1900	GBIF
MX	Oaxaca	UTEP	H-8309	16.3908	-94.1300	GBIF
MX	Oaxaca	LACM	38187	16.4708	-94.8300	GBIF
MX	Oaxaca	UCM	39940	16.3808	-96.3400	GBIF
MX	Oaxaca	CAS	169589	16.3708	-94.1700	GBIF
MX	Oaxaca	UAZ	27030	18.1520	-97.1010	GBIF
MX	Oaxaca	KU	58101	16.4308	-95.0500	GBIF
MX	Oaxaca	LACM	38186	16.4408	-94.7200	GBIF
MX	Oaxaca	UTEP	H-6006	16.4308	-94.2600	GBIF
MX	Oaxaca	KU	58102	16.2841	-95.2333	GBIF
MX	Oaxaca	MVZ	172391	17.0166	-97.9142	GBIF
MX	Oaxaca	MCZ	R-27801	16.3708	-94.1900	GBIF
MX	Oaxaca	LACM	38188	16.4108	-95.0800	GBIF
MX	Puebla	BUAP	1839	18.1680	-97.4680	GBIF
MX	Querétaro	MZFC	7547	26.2690	-99.0500	GBIF
MX	Quintana roo	UMMZ	113562	19.5830	-88.0330	GBIF
MX	Quintana Roo	KU	157575	19.3407	-88.0698	GBIF
MX	Sinaloa	LACM	6860	23.4104	-106.4003	GBIF
MX	Sinaloa	iNaturalist	395071	23.3527	-106.4750	GBIF
MX	Sinaloa	LACM	6864	23.5104	-106.6303	GBIF
MX	Sinaloa	MVZ	71340	23.1945	-106.2091	GBIF
MX	Sinaloa	LACM	103526	24.0904	-106.8203	GBIF
MX	Sinaloa	CAS	138867	23.9204	-106.8903	GBIF
MX	Sinaloa	MCZ	R-61419	23.4504	-106.4203	GBIF
MX	Sinaloa	MVZ	71338	23.4661	-106.4764	GBIF
MX	Sinaloa	MVZ	71342	23.1180	-106.0388	GBIF
MX	Sinaloa	LACM	6866	24.4104	-106.7003	GBIF
MX	Sinaloa	KU	67673	24.1004	-106.8303	GBIF
MX	Sinaloa	KU	73532	24.9003	-107.4003	GBIF
MX	Sinaloa	KU	78941	23.4504	-105.8403	GBIF
MX	Sinaloa	LACM	6872	25.5833	-107.3003	GBIF
MX	Sinaloa	LACM	6886	23.0904	-106.0103	GBIF
MX	Sinaloa	CAS	23822	23.9404	-106.8703	GBIF
MX	Sinaloa	LACM	6862	23.4604	-106.4603	GBIF
MX	Sinaloa	LACM	6876	23.9904	-106.9703	GBIF
MX	Sinaloa	KU	73530	23.3104	-106.4003	GBIF
MX	Sinaloa	CAS	23823	22.8004	-105.7103	GBIF
MX	Sinaloa	LACM	6877	23.3604	-106.1303	GBIF
MX	Sinaloa	LACM	103520	23.2504	-106.4203	GBIF
MX	Sinaloa	LACM	103528	22.5205	-105.4303	GBIF
MX	Sinaloa	LACM	136826	23.3204	-106.0003	GBIF
MX	Sinaloa	LACM	6874	24.7004	-107.3603	GBIF
MX	Sinaloa	LACM	125321	23.5604	-106.4703	GBIF
MX	Sinaloa	SBMNH	208	23.1931	-106.2492	GBIF
MX	Sinaloa	LACM	6880	23.3304	-106.4103	GBIF
MX	Sinaloa	KU	174805	23.9204	-106.8903	GBIF
MX	Sinaloa	LACM	103521	23.1604	-106.2203	GBIF
MX	Sinaloa	CAS	23821	24.2204	-107.0503	GBIF
MX	Sinaloa	MVZ	70286	23.4417	-106.4647	GBIF
MX	Sinaloa	MCZ	R-61421	23.5104	-106.3903	GBIF
MX	Sinaloa	KU	80752	23.7604	-106.6503	GBIF

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Table 1. Continued.

Country	State	Collection	Catalog number	Latitude	Longitude	Source
MX	Sinaloa	LACM	6863	23.6304	-106.5803	GBIF
MX	Sinaloa	LACM	6871	24.4404	-106.7003	GBIF
MX	Sinaloa	CAS	159373	24.7651	-107.3617	GBIF
MX	Sinaloa	MVZ	71339	23.4998	-106.4900	GBIF
MX	Sinaloa	KU	73531	24.1904	-107.1103	GBIF
MX	Sinaloa	LACM	6885	23.0904	-106.0103	GBIF
MX	Sinaloa	LACM	6875	24.2704	-107.2803	GBIF
MX	Sinaloa	LACM	6884	23.0904	-106.0103	GBIF
MX	Sinaloa	LACM	126260	23.5204	-106.4903	GBIF
MX	Sinaloa	MVZ	70287	23.6765	-106.5896	GBIF
MX	Sinaloa	LACM	6865	23.4804	-106.3903	GBIF
MX	Sinaloa	LACM	25912	23.2904	-106.2203	GBIF
MX	Sinaloa	KU	73528	23.3304	-106.4203	GBIF
MX	Sinaloa	MCZ	R-61418	23.4104	-106.3403	GBIF
MX	Sinaloa	CAS	159374	23.6504	-106.6903	GBIF
MX	Sinaloa	CAS	95759	24.7004	-107.3603	GBIF
MX	Sinaloa	LACM	6868	25.4703	-107.3803	GBIF
MX	Sinaloa	LACM	6887	23.0904	-106.0103	GBIF
MX	Sinaloa	LACM	76590	23.2604	-106.1203	GBIF
MX	Sinaloa	LACM	103522	24.1904	-107.2203	GBIF
MX	Sinaloa	LACM	103525	23.1604	-105.8703	GBIF
MX	Sinaloa	UTEP	H-5174	23.1904	-106.2703	GBIF
MX	Sinaloa	MVZ	71341	23.1799	-106.2202	GBIF
MX	Sinaloa	LACM	6858	23.4104	-106.4503	GBIF
MX	Sinaloa	LACM	103523	24.8004	-107.3903	GBIF
MX	Sinaloa	LACM	103524	24.8004	-107.3903	GBIF
MX	Sinaloa	KU	73529	23.5604	-106.5103	GBIF
MX	Sinaloa	LACM	6859	23.4704	-106.3903	GBIF
MX	Sinaloa	LACM	6867	25.4303	-107.4603	GBIF
MX	Sinaloa	LACM	7244	23.0904	-106.0103	GBIF
MX	Sinaloa	LACM	103527	22.5405	-105.5103	GBIF
MX	Sinaloa	LACM	6869	23.4604	-106.3203	GBIF
MX	Sinaloa	LACM	6873	23.0404	-105.8503	GBIF
MX	Sinaloa	CAS	23820	25.1907	-107.8462	GBIF
MX	Sinaloa	MCZ	R-61420	23.5104	-106.3903	GBIF
MX	Sinaloa	LACM	6870	24.1204	-106.7503	GBIF
MX	Sinaloa	LACM	6882	25.7303	-107.2503	GBIF
MX	Sinaloa	LACM	103529	22.5105	-105.4103	GBIF
MX	Sinaloa	LACM	6878	22.5338	-105.7336	GBIF
MX	Sinaloa	LACM	121326	25.1803	-107.9803	GBIF
MX	Sinaloa	CAS	105002	24.8212	-107.4942	GBIF
MX	Sinaloa	KU	68752	26.8403	-108.2604	GBIF
MX	Sinaloa	LACM	6861	24.0904	-107.0403	GBIF
MX	Sinaloa	LACM	6879	23.4504	-106.4603	GBIF
MX	Sinaloa	LACM	6881	24.1204	-107.0703	GBIF
MX	Sonora	MVZ	137741	27.0667	-109.0414	GBIF
MX	Sonora	CAS	138868	27.0203	-108.9304	GBIF
MX	Sonora	LACM	103530	27.0811	-109.0815	GBIF
MX	Sonora	UAZ	UAZ 56042-PSV	28.4079	-109.1125	GBIF
MX	Tamaulipas	MNHUK	174806	22.8920	-98.0730	GBIF
MX	Veracruz	MCZ	R-45679	18.8840	-96.7834	GBIF
MX	Veracruz	CUMV	12631	18.5340	-95.6500	GBIF
MX	Veracruz	UCM	48112	21.8305	-97.7601	GBIF
MX	Veracruz	CAS	132163	20.2073	-96.7767	GBIF
MX	Veracruz	KU	140062	19.5006	-96.8356	GBIF
MX	Veracruz	UTEP	H-6005	18.4840	-95.0667	GBIF
MX	Yucatán	MCZ	R-7245	21.2839	-89.6666	GBIF
MX	Yucatán	CM	49652	20.6906	-88.5799	GBIF
MX	Yucatán	CM	46930	20.6906	-88.5799	GBIF
MX	Yucatán	MCZ	R-7239	20.6673	-88.5665	GBIF
MX	Yucatán	FMNH	36243	20.6830	-88.6830	GBIF

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Table 1. *Continued.*

Country	State	Collection	Catalog number	Latitude	Longitude	Source
MX	Yucatán	UMMZ	80936	20.6830	-88.5670	GBIF
MX	Yucatán	FMNH	36239	20.7000	-88.8170	GBIF
MX	Yucatán	KU	157576	20.4106	-89.7799	GBIF
MX	Yucatán	FMNH	153577	21.0970	-89.5990	GBIF
MX	Yucatán	FMNH	20602	20.6830	-88.5670	GBIF
MX	Yucatán	FMNH	20601	20.6830	-88.5670	GBIF
MX	Yucatán	UMRC	79-303	20.8000	-89.0330	GBIF
MX	Yucatán	UMMZ	73033	20.6830	-88.5670	GBIF
MX	Yucatán	FMNH	153577	21.0330	-89.5670	GBIF
MX	Yucatán	FMNH	36242	20.7000	-88.8170	GBIF
MX	Yucatán	FMNH	36240	20.7000	-88.8170	GBIF
MX	Yucatán	ND	NA / 2272 / W030	20.9670	-89.9170	GBIF
MX	Yucatán	CMNH	46930	20.7000	-88.7500	GBIF
MX	Yucatán	FMNH	36241	20.6830	-88.6830	GBIF
MX	Yucatán	CMNH	49652	20.7000	-88.7500	GBIF
MX	Yucatán	KU	171699	20.9406	-88.6799	GBIF
MX	Zacatecas	SDSNH_HerpPC	05340	22.6847	-103.7345	This study
PA	Chame	AMNH	90020	8.5555	-79.8688	GBIF
SV	San Salvador	KU	183890	13.6667	-89.1000	GBIF
SV	San Salvador	KU	62100	13.7000	-89.2000	GBIF
SV	San Salvador	KU	183889	13.6667	-89.1000	GBIF
SV	San Salvador	KU	62099	13.7000	-89.2000	GBIF